at1117paper: Complete the Square (v0)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 36 feet. Their combined area, found by adding the square's area and the rectangle's area, is 765 square feet. What is the value of x?

Example's Solution

$$x^2 + 36 = 765$$

To complete the square, add $\left(\frac{36}{2}\right)^2 = 324$ to both sides.

$$x^2 + 36 + 324 = 1089$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 18)^2 = 1089$$

Undo the squaring.

$$x + 18 = \pm\sqrt{1089}$$

$$x + 18 = \pm 33$$

Subtract 18 from both sides.

$$x = -18 \pm 33$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 15$$